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# Department of Labor

**Occupational Safety and Health Administration**

**29 CFR Part 1926**

**Concrete and Masonry Construction Safety Standards; Lift Slab Construction; Notice of Proposed Rulemaking**

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**DEPARTMENT OF LABOR**

**Occupational Safety and Health Administration**

**29 CFR Part 1926**

**[Docket No. S-301B]**

## Concrete and Masonry Construction Safety Standards; Lift Slab Construction

**AGENCY:** Occupational Safety and Health Administration (OSHA), U.S. Department of Labor.

**ACTION:** Notice of proposed rulemaking; Availability of new information on lift-slab construction.

**SUMMARY:** This Notice announces that the Occupational Safety and Health Administration (OSHA) is reproposing its Construction Safety Standards for Lift-Slab Operations. Specific requirements for lift-slab operations were originally proposed for revision as part of the Notice of Proposed Rulemaking (NPRM) for Concrete and Masonry Construction. The purpose of the reproposal is to update the specific lift-slab requirements which have been incorporated by reference from the American National Standard Safety Requirements for Concrete Construction and Masonry Work, ANSI A10.9–1970. In addition, OSHA proposes to promulgate and codify directly into the OSHA standards, new requirements to protect the safety and health of workers engaged in lift-slab operations. By this revision, OSHA will eliminate any ambiguities caused by incorporating standards by reference and will also strengthen the lift-slab requirements by eliminating weaknesses or gaps in coverage that exist through the reference to the outdated ANSI standard.

**DATES:** Comments on this proposal must be postmarked by November 14, 1988. Hearing requests must be postmarked by November 14, 1988.

**ADDRESS:** Comments and requests for a hearing are to be sent to the Docket Officer, Docket No. S–301B, U.S. Department of Labor, Room N3670, 200 Constitution Avenue NW., Washington, DC 20210.

**FOR FURTHER INFORMATION CONTACT:** Mr. James Foster, Occupational Safety and Health Administration, Room N3637, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210. Telephone (202) 523–8148.

**SUPPLEMENTARY INFORMATION:**

### I. Background

Congress amended the Contract Work Hours Standards Act [40 U.S.C. 327 et seq.] in 1969 by adding a new section 107 (40 U.S.C. 333) to provide employees in the construction industry with a safer work environment and to reduce the frequency and severity of construction accidents and injuries. The amendment, commonly known as the Construction Safety Act [Pub. L. 91–54; August 9, 1969], significantly strengthened employee protection by providing for occupational safety and health standards for employees of the building trades and construction industry in Federal and Federally-financed or Federally-assisted construction projects. Accordingly, the Secretary of Labor issued Safety and Health Regulations for Construction in 29 CFR Part 1518 (36 CFR 7340, April 17, 1971) pursuant to section 107 of the Contract Work Hours and Safety Standards Act.

The Occupational Safety and Health Act (OSH Act) (84 Stat. 1590; 29 U.S.C. 651 et seq.), which was enacted by Congress in 1970, authorized the Secretary of Labor to adopt established Federal standards issued under other statutes, including the Construction Safety Act, as occupational safety and health standards. Accordingly, the Secretary of Labor adopted the Construction Standards, which were issued under the Construction Safety Act in 29 CFR Part 1518, under section 6(a) of the OSH Act (36 FR 10466, May 29, 1971). The Safety and Health Regulations for Construction, Part 1518, were redesignated as Part 1926 at the end of 1971 (36 FR 25232, December 30, 1971). The standard entitled Concrete, Concrete Forms, and Shoring, §§ 1926.700 through .702, was adopted as an OSHA standard as part of this process. As discussed below, this standard was partially revised on June 16, 1988, based on an earlier proposal.

On September 16, 1985, OSHA proposed to revise its construction industry safety standard addressing concrete and masonry construction (50 FR 37543). One section of the proposed standard contained specific requirements for lift-slab construction operations. Comments on the proposed standard were received by OSHA through December 16, 1985. A public hearing was held in Washington, DC, to discuss the proposed rule on June 17–18, 1986. A final rule was published on June 16, 1988 (53 FR 22612). In that final rule, OSHA indicated that it was not revising the existing requirements for lift-slab operations until the record could be reopened on that issue and new information and evidence entered into the record. That new information would then be used as a basis for promulgating revised standards for lift-slab operations. The reopening of the record was necessitated by a tragic accident involving the lift-slab method of construction.

Specifically, on April 23, 1987, a 13-story, two-tower building (the L'Ambiance Plaza) under construction in Bridgeport, Connecticut, collapsed. The L'Ambiance Plaza building was being erected using the lift-slab construction method. Twenty-eight construction workers were killed and 10 injured in that collapse, making it the highest death toll from a workplace accident in the United States since 15 employees were killed in 1978 during construction of a cooling tower at Willow Island, West Virginia. OSHA immediately began an investigation with the assistance of the National Bureau of Standards (NBS) of the U.S. Department of Commerce. The following excerpt is taken from the NBS Report entitled, "Investigation of the L'Ambiance Plaza Building Collapse in Bridgeport, Connecticut, NBSIR 87–3640" (Ex. 34).

> The most probable cause of the collapse was determined to be loss of support at a lifting jack in the west tower during placement of an upper level package of three floor slabs. The loss of support was likely due to excessive deformation of the lifting angle in a shearhead followed by a lifting nut slipping off the lifting angle of the shearhead. The postulated failure mechanism was duplicated in laboratory experiments. The local failure propagated as loads were redistributed. The remaining jack rods along column line E supporting the package of floor slabs slipped off the lifting angles and the slabs failed in flexure and shear. These slabs fell causing the lower levels slabs to fail.

During the course of the investigation, OSHA began to question the completeness of its proposed safety standards for concrete and masonry construction as they pertained to lift-slab construction operations. A review of the record indicated that OSHA had very little information from comments received in response to the Notice of Proposed Rulemaking, or as a result of the hearings that had been held. In fact, only one comment was directly related to lift-slab construction. OSHA's Advisory Committee on Construction Safety and Health (ACCSH), at its meeting of November 30-December 1, 1982, at which the draft concrete standard was discussed, had not made any specific recommendations to OSHA with regard to the lift-slab provisions.

To ensure that the regulations would provide a proper level of safety to workers engaged in lift-slab construction operations, and to ensure that the L'Ambiance Plaza information would be properly evaluated and considered before revising the lift-slab regulations, OSHA decided to reopen

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the record which had been closed on December 8, 1986, to receive the L'Ambiance Plaza information and evidence now available, as well as any other information pertaining to lift-slab construction that may be forthcoming.

As stated above, when OSHA published the Final Rule for Concrete and Masonry Construction, it announced that § 1926.705, Lift-Slab Operations, would not be revised as part of that Final Rule. OSHA also announced that the existing standards (which reference the ANSI A10.9–1970 standards) specific to lift-slab construction operations would continue in effect until completion of the reproposed action.

As a first step in the new rulemaking process for lift-slab operations, OSHA met with its Advisory Committee on Construction Safety and Health (ACCSH). (A copy of the transcript of that discussion can be found at Exhibit 35–2). At the March 30, 1988, ACCSH meeting, OSHA received several recommendations. Specifically, the ACCSH recommended that OSHA include the building columns among the items that must be designed with a safety factor of at least 2.5. ACCSH was referring to the existing ANSI standard that requires that ". . . the threaded rods and other members which transmit loads to the jacks shall have a minimum safety factor of 2.5."

The ACCSH also supported a motion put forth by the ACCSH representative from the Building and Construction Trades Department. The motion was that OSHA require that "Lift-slab operations shall be designed, planned, and supervised by a professional engineer or architect, licensed in the state where the work is being performed."

Finally, ACCSH members discussed their thoughts with regard to employees working under loads including working under slabs which were not secured, passing a motion which stated that as a general rule they did not endorse employees working under any loads. Further discussion on these issues appears in the *Specific Issues* section of this document, where OSHA solicits information on issues which have already generated special attention by affected parties.

Before beginning a summary and explanation of the proposed rule, OSHA feels it is important for readers to have a basic understanding of the lift-slab construction technique. OSHA believes that one of the possible reasons that commenters failed to address lift-slab operations in the original proposal was that this technique is not widely used, accounting for only a small percentage—probably less than one percent—of all building construction activity.

The National Bureau of Standards in their study entitled, *Investigation of L'Ambiance Plaza Building Collapse in Bridgeport, Connecticut* (NBSIR 87–3640) described the lift-slab method as follows:

> In the lift-slab method of construction, floor and roof slabs are cast one on top of the other at ground level. The floors are usually two-way post-tensioned flat plates of either regular or lightweight concrete. After post-tensioning, the slabs are lifted to their positions by hydraulic jacks and are secured to the columns.

NBS goes on to say that "By casting the slabs at ground level, lift-slab construction can eliminate 90 percent of the formwork required for cast-in-place construction and reduce labor requirements. Cost savings and speed of construction are two primary advantages claimed for lift-slab construction." (Ex. 34, p. 1).

OSHA invites readers to compare this technique with other construction techniques, such as cast-in-place construction. During cast-in-place construction, formwork is used to support the weight of freshly placed concrete and continues to provide support until the concrete has achieved the strength necessary to support itself and all superimposed loads. Workers are not prohibited from working in buildings under such loads during the time that the concrete is gaining its strength. However, OSHA does require that the formwork be capable of supporting without failure all loads that may reasonably be anticipated to be applied to the formwork.

In contrast, in the lift-slab method of construction, OSHA is proposing to continue the existing requirement that workers not be permitted to work under slabs which have not been secured, neither would they be permitted to work under slabs that have been secured if other slabs on upper levels were being lifted, a process described in the proposed regulations as "jacking operations." Of course, the proposed requirement would not prohibit essential workers—those workers who have the task of controlling the jacking operations and securing the slabs—from working under slabs.

Prior to the L'Ambiance Plaza collapse, according to one lift-slab contractor, it was common practice for employees to work in buildings being constructed by the lift-slab method just as long as the floor slab immediately above them had been secured. This meant that "jacking operations" may have been in progress on upper levels, and those floors were thus "suspended on the jacks." A failure of any component of the jacking system, not unlike a failure of the formwork system in cast-in-place work, could result in other components being overloaded or in the dropping of a suspended floor which could, in turn, result in total collapse of the building. Such failures have occurred in both cast-in-place and in the lift-slab method of construction. OSHA observes, however, that it has limited data on building failures where the lift-slab method of construction was used. OSHA is only aware of one lift-slab-constructed building failure since its inception in 1971—the 1987 L'Ambiance Plaza failure. Published materials, however, describe several failures that occurred in the years 1952, 1954, 1956, 1961, and 1962. (Reference: Feld, Jacob, *Construction Failure*, John Wiley & Sons, Inc., New York; 1968) (Ex. 35–1).

At the March 30, 1988, ACCSH meeting, a representative of a lift-slab construction firm addressed the Committee and spoke on the subject of employees working under slabs while jacking operations were in progress. (Ex. 35–2, p. 150). Specifically, the representative stated:

> Another very important area of disagreement is our position that other trades be allowed to work inside a building under secured slabs while lifting is in progress on upper floors. This has been the normal practice around the world and really is not different than what is normal practice of other structural methods. Similar conditions exist on multi-story, cast-in-place concrete frames, during the pouring and curing of an upper floor.

The representative further stated:

> On precast frames or masonry frames, the same thing applies during the erection of those precast members. On steel frames, during the erection of the steel members and the pouring of the decks up above, workmen are allowed to do their trades below. We really do not see why our methods should be restrained in the way proposed, from competing with other structural systems.

The public commenter in comparing the risks of precast with lift-slab construction remarked, ". . . some of the precast members are very, very heavy and very large on multi-story buildings; there are trades working below. God forbid, one lets go, there is going to be a catastrophe, there is no question about it . . ." (Ex. 35–2, p. 154).

This statement prompts OSHA to ask for public comment, in the Specific Issues section of this preamble, on whether or not employees working on precast or cast-in-place sites are exposed to the same type of hazard that is being regulated for the lift-slab

technique. (See Question #12 in the Specific Issues section below).

**II. Summary and Explanation of Proposal**

References to an ANSI standard in this section are to the provisions of the ANSI A10.9–1970 standard, except where noted. The ANSI standard contains a section specific to lift-slab operations. That section has been incorporated by reference in the OSHA standards, thereby serving as the existing standard.

*Section 1926.700(b) Definitions.*

In paragraph (b)(9) of § 1926.700, OSHA proposes to add a definition of the term "jacking operations." OSHA defines jacking operations as the task of lifting a slab (or group of slabs, sometimes referred to as a "package" or "pick") from one location to another, e.g., from the casting location to a temporary (parked) location, or from a temporary location to another temporary location, or to the final location of the slabs in the structure. The existing standard does not contain a definition for this term, however, OSHA believes it is necessary to define this term so that employers will completely understand the provisions where this term is used.

In paragraph (b)(10) of § 1926.700, OSHA proposes to add a definition for the term "qualified designer." OSHA defines qualified designer to mean a person who, by possession of a degree, certification, or professional standing, has demonstrated ability in design in the subject under regulation. In this standard, such an individual must be qualified in the design of lift-slab operations. The existing standard does not contain a definition for qualified designer. However, since the proposed standard contains a provision which uses the term "qualified designer," and because another provision in the existing Concrete and Masonry Construction Standard also contains a provision using the term "qualified designer," OSHA has proposed to define this term. The definition proposed by OSHA is based on the ANSI definition for qualified designer that is contained in the ANSI A10.9–1983, American National Standard for Construction and Demolition Operations—Concrete and Masonry Work—Safety Requirements. Since the requirements for lift-slab operations are almost exclusively taken from the ANSI standard and the ANSI standard is the consensus standard for Concrete and Masonry Work, OSHA believes it is appropriate to base its definition on the most recent ANSI standard.

OSHA invites specific comment (see Question #1 in the Specific Issues section below) on an issue related to this definition, which may require OSHA to define additional terms or, perhaps, to delete the term defined here. Specifically, OSHA is asking for information on whether or not it should require the employer to have a professional engineer or architect, licensed in the state where the work is to be performed, to design and plan the lift-slab project instead of a "qualified designer." OSHA is also requesting comment on whether or not a person (a registered professional engineer, for example) other than, or perhaps in addition to, the contractor should supervise the construction operation.

*Section 1926.705 Lift-slab operations.*

Section 1926.705 of the proposed rule contains specific requirements for lift-slab construction operations and are in addition to the general requirements for all concrete construction contained in other sections of Subpart Q (Concrete and Masonry Construction) of 29 CFR Part 1926.

Paragraph (a) would require that lift-slab operations be designed and planned by a qualified designer (i.e. qualifed in lift-slab operations); that all plans and designs be implemented by the employer; and, that the plans and designs include detailed instructions and sketches indicating the prescribed method of erection. The existing rule, ANSI section 11.2, contains essentially the same provision except that it requires a *"qualified professional engineer or architect"* to design and plan the lift-slab operations. OSHA is proposing to revise the existing rule to bring it in line with the most recent ANSI Standard, A10.9–1983, which in section 10.2, requires a *"qualified designer"* to plan and design lift-slab operations.

OSHA has received one recommendation with regard to this provision. That recommendation came from the members of the ACCSH who recommended that the proposed paragraph (a) requirement for a qualified designer be changed to require that a professional engineeer or architect, licensed in the state where the work would be done, plan, design, and supervise the erection process. Specific public comment is requested on this point in Question #1 of the Specific Issues section below.

Paragraph (b) of the proposed rule would require that jacks be marked to indicate the rated capacity established by the manufacturer. This is an existing requirement in § 1926.305(a)(1) and it applies to all jacks used in construction activities. OSHA is not recommending any substantive revision to this provision, but is simply repeating this provision in the lift-slab operation section in an effort to locate all requirements unique to lift-slab operations in the same section of the construction safety and health standards. OSHA believes it is necessary for employers to ensure that each jack has the rated capacity marked so there will be no question as to what loads can be placed on the jacks.

Paragraph (c) of the proposed rule would require that jacks not be loaded beyond the rated capacity established by the manufacturer. This, too, is an existing requirement in § 1926.305(a)(1), and is being repeated in the proposed lift-slab section for the same reasons discussed in (b) above. Again, OSHA is not recommending any substantive revision to this existing requirement.

Paragraph (d) of the proposed rule would require that jacking equipment not be overloaded and that the threaded rods and other members that transmit loads to the jacks be capable of supporting at least two and one-half times the load to be applied. This provision is an existing requirement in section 11.3.1 of the ANSI standard. The provision is also continued in the more recent ANSI A10.9–1983 standard in section 10.3.1. OSHA is proposing to change the existing requirement by including in the provision, the identity of some of the jacking equipment components which are subject to the 2.5 factor of safety. Specifically, OSHA interprets, as recently clarified by the American National Standards Institute (Ex. 35–3), that the 2.5 safety factor applies to all the jacking equipment including, but not limited to, jacks and other lifting units, lifting angles, lifting nuts, hook-up collars, T-caps, shearheads, columns, and footings. OSHA realizes that there may be some disagreement over whether or not it is necessary to require the shearheads, columns, and footings to be designed with a 2.5 safety factor and has addressed this issue in Question #2 of the Specific Issues section below. OSHA has not attempted to identify every single component that would be considered jacking equipment because as new contractors enter the lift-slab construction business, they may not identify their components with the same names used by other contractors. OSHA does not wish to create loopholes by failing to identify specifically every component that could possibly be a part of the jacking equipment nor does it want to be vague about which

components must meet the 2.5 safety factor.

OSHA is considering further revision of this provision and has asked comment about it in Question #4 of the Specific Issues section below.

Paragraph (e) of the proposed rule would require that jacks be installed and designed so that they will neither lift nor continue to lift when their rated capacity is exceeded. This proposed requirement is essentially the same as the existing requirement found in section 11.3.2 of the ANSI A10.9–1970 standard, and is also essentially the same as section 10.3.2 of the most current ANSI standard, A10.9–1983. OSHA observes that a similar provision was proposed in the NPRM of 1985, however, no comments were received on the 1985 NPRM provision.

Paragraph (f) of the proposed rule would require that jacks used in lift-slab construction be equipped with a safety device which will enable the jacks to support the load in any position in the event any jack malfunctions or loses its lifting ability. OSHA observes that this proposed provision is essentially the same as an existing requirement in § 1926.305(b)(1) and is also identical to both a provision in section 11.3.3 of the ANSI A10.9–1970 standard and to section 10.3.3 of the updated ANSI A10.9–1983 standard. OSHA notes that one comment received on the 1985 NPRM related to this provision. That comment was from the Washington Metropolitan Area Construction Safety Association (WMACSA) (Ex. 14–29) who suggested that OSHA add a requirement to install the safety device as required by this paragraph. WMACSA supported the need for this provision by pointing out that the ANSI A10.9 standard contained such a provision in the lift slab section.

OSHA observes, as stated above, that the existing requirement in § 1926.305(b)(1), nearly identical to the ANSI requirement, already addresses this hazard. However, because OSHA believes it is important to locate all provisions unique to lift-slab construction in the same section of its regulations, it has determined that this provision and another provision specifically related to lift-slab jacks in § 1926.305(b)(2), should be relocated to the lift-slab operations section of the Concrete and Masonry Construction Standards. These two provisions are identified as paragraphs (f) and (h) of this proposed rule. OSHA proposes to remove the requirements entirely from their present location—§ 1926.305(b)—to avoid further confusion.

Paragraphs (g), (h), and (i) contain three requirements which are essentially the same as existing requirements in section 11.4 of the ANSI A10.9–1970 standard and essentially the same as the provisions in Section 10.4 of the ANSI A10.9–1983 standard, except that in the ANSI documents all three of the requirements are combined into one paragraph. Also, as discussed above, paragraph (h) of the proposal contains essentially the same requirement as the existing provision in § 1926.305(b)(2). The intent of these requirements is to prevent subjecting the slab to stresses beyond the engineered limits. OSHA observes that a failure in the slab could result in collapse of the building which most likely would be accompanied by injury and death of workers.

Paragraph (g) of the proposed rule would require the employer to synchronize jacking operations in a manner that will ensure all points of the slab support are kept within ½ inch of that needed to maintain the slab in a level position.

Paragraph (h) of the proposed rule would require that where leveling is automatically controlled, the employer must install a device to stop the operation when the ½ inch leveling tolerance is exceeded or where there is a malfunction in the jacking system.

Paragraph (i) of the proposed rule would require that where leveling is maintained by manual controls, the employer must locate such controls in a central location and have a competent person attend the controls while lifting is in progress.

OSHA proposes to separate the three distinctive requirements and propose one change in paragraph (i). In particular, OSHA proposes that a *competent person* be required to attend the controls while lifting is in progress and leveling is maintained by manual controls. OSHA observes that the 1970 ANSI standard prescribes that a "trained operator" attend the manual controls, whereas the 1983 ANSI A10.9 standard prescribes that a "qualified person" attend the controls. OSHA believes a competent person, as defined in § 1926.32(f), is the appropriate term to use in this standard to describe the qualifications of the person who attends the controls. Additionally, OSHA observes that the term "competent person" is used in many provisions of the construction safety and health standards to describe the minimum level of experience and authority needed to provide an acceptable level of safety for workers.

For these reasons, OSHA is proposing to revise the existing requirement by substituting the term "competent person" for the existing term, "trained operator," so that the provision would require that a *competent person* attend the controls while lifting is in progress. OSHA notes that the term competent person is defined in § 1926.32(f) to mean "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them."

OSHA also notes that it proposed an essentially similar requirement in its 1985 Notice of Proposed Rulemaking. There were no comments on this particular provision of the 1985 proposal.

Paragraph (j) of the proposed rule would require the employer to limit the maximum number of manually controlled jacks on one slab to a number that will permit the operator to maintain the slab level within specified tolerances. This provision is similar to a provision in section 11.3.4 of the ANSI standard, and also to the provision in section 10.3.4 of the ANSI A10.9–1983 standard except that both of the ANSI standards specify that the number of jacks should not exceed *14*. ANSI further prescribes that in no event should the number of jacks be too great to permit the operator to maintain the slab level within specified tolerances.

However, in keeping with OSHA's efforts to develop more performance-oriented standards, OSHA is proposing to revise the existing requirement to eliminate the specific number "14" and instead require the employer to limit the number of jacks on one slab to a number that will permit the operator to maintain the slab level within specified tolerances. OSHA notes that it is unaware of the reasons why both the 1970 and 1983 ANSI standards specify the number 14 since OSHA believes that common industry practice is to operate all jacks automatically, except in limited situations such as when setting wedges. During the wedge setting phase, automatic jacking operations may cease while individual jacks are operated manually, as needed, to complete the wedge setting operation. This process normally involves the manual control of only one or two jacks. Thus, OSHA has proposed to revise the existing requirement as stated above.

OSHA invites comments on whether or not it should continue to specify the maximum number of jacks as the ANSI standards do. Specifically, OSHA would like to know if employee safety would be enhanced if OSHA specified a maximum number of jacks that could be used on one slab? OSHA also questions whether "14" is the appropriate number.

If not, what is the appropriate number and what are the reasons for recommending a number that differs from ANSI?

Paragraph (k) of the proposed rule would require the employer to prohibit employees (except those essential to the jacking operation) from being in the building while any jacking operation is taking place. OSHA would explain in this provision that a jacking operation begins when a slab (or groups of slabs) is lifted and ends when such slabs are secured with either temporary or permanent connections.

The proposed provision is based on provisions in both the 1970 and the 1983 versions of the ANSI A10.9 standard. OSHA notes that ANSI has recently provided an interpretation of these provisions. (Ex. 35–3). Specifically, ANSI interpreted the provisions to mean that no one is permitted anywhere below any slab being jacked, noting that the restriction prohibits employees (except those essential for the jacking operation and to secure the slabs) from working below lower floor slabs which are secured temporarily or permanently if any upper floor slab is being jacked.

The proposed provision is somewhat different from the existing standard as interpreted by ANSI in that the proposed provision prohibits employees from being "in the building" rather than just "below any slabs during jacking operations"—the language used in ANSI's interpretation. The proposed provision is intended to clarify those situations where a building has been divided into sections or portions for the purpose of carrying out lifing operations. For example, a building may be so large that rather than lift the entire floor in one jacking operation, the floors may be cast and lifted in two sections. Thus, it is possible that using the ANSI language, employers could misunderstand the provision to mean that while one section was being lifted, employees would be permitted to work in another section as long as no jacking operations were being carried out in that section. However, a review of the disaster at L'Ambiance Plaza in Bridgeport, Connecticut, (where the Plaza was constructed as two towers) shows that employees are at risk if they are allowed to remain in one portion of a structure or building while another portion is being lifted. Thus, OSHA believes that in order to afford a proper level of safety, all nonessential employees must be removed from the entire building while any jacking operation is taking place. OSHA observes that compliance with this proposed provision may have saved many of the lives lost in the Bridgeport disaster.

Additionally, OSHA notes that using the lift-slab construction technique, floor slabs are cast at ground level and later lifted to their final position. OSHA has determined that if a slab(s) being lifted were to fall, even where it is several floors above where employees are located, it has the potential to continue its descent until reaching ground level, with possible catastrophic consequences. This is essentially what happened in the Bridgeport collapse. Therefore, in order to protect employees from this hazard, OSHA believes nonessential employees must leave the building whenever any jacking operations are taking place. Employees would not be permitted to reenter any such building until jacking operations have ended, i.e., all the slabs are secured. To facilitate compliance with this provision, employers may need only to schedule their jacking operations at times when other trades are not present, e.g., at night or on weekends.

Paragraph (l) of the proposed rule would require that when making temporary connections, the wedges must be secured by tack welding or an equivalent method of securing. This would be a new provision which OSHA is proposing because it has come to OSHA's attention that there is some confusion with regard to how wedges need to be secured before releasing the load from the lifting unit (i.e., jack). In particular, OSHA staff on at least one occasion has had discussions with a lift-slab contractor regarding the contractor's intent to use chicken wire and other unacceptable materials to secure the wedges when making temporary connections of floor slabs to columns. OSHA believes that it is vitally important for the safety of workers that temporary connections be secured by tack welding or other equivalent method.

Paragraph (m) of the proposed rule would require that all welding on temporary and permanent connections be performed by a certified welder who is familiar with the welding requirements specified in the lift-slab plan and specifications. This would be a new provision which OSHA believes would afford a degree of safety which is not afforded by the existing standard. In particular, the existing standard does not address welding of connections and OSHA feels very strongly that only certified welders should be allowed to perform these critical welding tasks. OSHA notes that in order to be classified as a certified welder, the welder must have demonstrated welding ability, and the capability to perform critical welding tasks that would be required to make temporary and permanent connections. It is OSHA's belief that welders who have not demonstrated such abilities (that is, are not "certified") should not perform critical welding tasks when the lives of themselves and other workers are at risk. OSHA observes that a failure of a weld could result in losing support for a slab and ultimate collapse of the building.

Additionally, OSHA observes that in its conversations with two U.S. construction firms who use the lift-slab technique, both stated that only certified welders were hired for critical welding tasks. Apparently both these firms recognize, as OSHA does, the critical role that these welding tasks play with regard to worker safety. (Note that OSHA seeks additional information on certified welders in Question #13 in the Specific Issues section below).

Paragraph (n) of the proposed rule would prohibit load transfer from the jacks to the building columns until the welds on the column shear plates are cooled to air temperature. This would be a new provision. It is based on a provision in section 10.6 of ANSI A10.9–1983. OSHA believes that the ANSI provision appropriately addresses the hazard of transferring loads onto welds that have not yet cooled.

### III. Specific Issues

The public is invited to comment on the following issues. The comments should contain adequate information and evidence, when available, to support the position of the writer.

1. OSHA is proposing in § 1926.705(a) that lift-slab operations be designed and planned by a "qualified designer." Would employees be afforded a greater level of protection if OSHA revised this provision to require the work to be done by an "engineer" or "architect?" If so, what particular classification of engineer would afford the appropriate level of protection (e.g., structural, registered professional engineer)? As mentioned above, OSHA has received a recommendation from its Advisory Committee on Construction Safety and Health (ACCSH) that the term "qualified designer" be replaced with the phrase "professional engineer or architect, licensed in the state where the work is to be done." The ACCSH also recommended that the provision be expanded so that the professional engineer or architect would be required to "supervise" the lift-slab project in addition to the designing and planning requirements proposed by OSHA.

OSHA solicits comment on the recommendation.

2. OSHA is proposing in § 1926.705(d) that threaded rods and other members that transmit loads to the jacks be capable of supporting at least two and one-half times the load to be applied. OSHA interprets the words "other members" in this provision to include the shearheads, columns, and footings. There have been indications that some parties disagree with this interpretation, arguing that there is no need to include these components in this provision. In particular, a public participant at the March 30, 1988, ACCSH meeting said (Ex. 35–2, p. 150) that he disagreed with the application of the 2.5 safety factor to columns, shearheads and footings because "these three items are more than adequately covered during normal design practices using standards put forth in the American Institute of Steel Construction, American Concrete Institute, and the Post-Tensioning Institute." OSHA requests comments on whether or not the shearheads and the building columns and footings should be considered "other members" for the purpose of this provision?

3. OSHA believes that it may be appropriate to require employers to prepare a certification record, which they would sign and keep on file for review at the time of an OSHA inspection. The certification record would contain the name of the person or organization that determined that the jacking equipment met the 2.5 safety factor and the date that such determination was made. OSHA invites comments on the benefits to employee safety that would result if OSHA required such an assurance from employers.

4. As discussed in the summary and explanation of this provision, OSHA invites comments on rewording § 1926.705(d) (which as proposed reads essentially the same as the ANSI A10.9–1983 provision) to read as follows:

(a) Jacking equipment shall not be overloaded.

(b) Jacking equipment (such as, but not limited to the following: lifting units (e.g., jacks), threaded rods, lifting angles, lifting nuts, hook-up collars, T-caps, shear plates, shearheads, columns, and footings) shall be capable of supporting at least two and one-half times the load to be applied.

As mentioned above, OSHA is concerned that if it fails to identify all components which are part of jacking equipment, employers will mistakenly believe that not all components must be able to support at least 2.5 times the load to be applied to them. On the other hand, as new employers enter the lift-slab construction business, OSHA is concerned they will rename parts or use parts which are commonly identified by other names, and again mistakenly believe that those components are not subject to the 2.5 safety factor. OSHA notes that existing lift-slab contractors do not always identify jacking equipment components by the same terms, yet the function of the equipment may be essentially the same. OSHA requests comment on how to word this provision to avoid any such misunderstanding.

5. OSHA solicits information on whether or not specific requirements for lateral stability should become a part of the final rule. In particular, OSHA wishes to know whether or not the building plans and specifications typically address lateral stability. And, if so, are such plans and specifications routinely kept at the construction site; are these plans and specifications followed; and who does the employer designate (e.g., a professional engineer, a competent person, or itself) as the person responsible for overseeing compliance with the building plans and specifications? If the building plans and specifications do not address lateral stability, who determines what action will be taken to ensure that lateral stability is provided?

6. OSHA solicits comments on the need to require employers to maintain the building plumb during jacking operations. What is the current industry practice with regard to keeping the building plumb?

7. OSHA requests comments on the need to include requirements in the final rule that address employee access and egress during the erection of lift-slab buildings. OSHA requests information on how employees gain access to upper level slabs (1) to erect scaffolds; (2) to set wedges and make temporary connections; (3) to make permanent connections; and (4) to perform other activities (such as electrical, plumbing, etc.). OSHA also wishes to know what means of rapid escape from upper slabs are presently being used for emergency situations such as fire, explosion or structural failure.

8. When are stairways or ladders installed to provide access and egress to upper floor levels?

9. OSHA frequently uses the term "jacks" in the proposed requirements. Since other lifting units (not always referred to as jacks) can be used in lift-slab operations, is there a need for OSHA to substitute the term "lifting units" for the term "jacks", or is the term "jacks" commonly understood to include such other equipment?

10. OSHA is considering promulgating a specific requirement that jacks (or possibly "lifting units") be secured to building columns so that they will not become dislodged or dislocated. What is the current industry practice with regard to securing jacks to columns?

11. In § 1926.705(k), OSHA is proposing to continue the existing requirement that allows only employees essential to jacking operations to be in the building during jacking operations. OSHA has two concerns on which it seeks comment with regard to this provision.

(a) OSHA is aware that controversy exists with regard to the existing and proposed provisions in that some individuals believe the evacuation of nonessential employees during jacking operations is not necessary. OSHA, of course, will consider all submitted suggestions for alternative solutions to the prohibition of nonessential employees in the building during jacking operations. In particular, OSHA would like to evaluate any engineering controls or solutions that may be used or are available to protect employees. For example, would the use of shoring systems to support the floors be sufficient protection to allow nonessential employees to work under slabs in the event of a collapse? Such suggested solutions must be discussed in detail and demonstrate how the solution offers employee protection equivalent to keeping nonessential workers out of the building during jacking operations.

(b) OSHA is considering identifying, by job function, employees who would be considered the "essential" employees. OSHA requests comment on which job functions employers consider essential to jacking operations and how far away from the building should nonessential employees be during jacking operations.

12. Is there a need to revise other regulations in the Construction Safety and Health Standards to prohibit workers from being in buildings while precast members are being positioned and secured, or while cast-in-place concrete is being cured?

13. The National Bureau of Standards has recommended to OSHA that fracture toughness values should be specified for rods used in lift slab construction. NBS pointed out that fracture toughness values are presently specified for steels used in bridges, pressure vessels, ship structures and other transportation applications (Ex. 35–4). OSHA solicits comment on whether it should specify a particular value for the rods and, if so, what should that value be and why?

14. OSHA is proposing in § 1926.705(m) that all welding of

temporary and permanent connections be performed by a certified welder. As stated above, OSHA believes that it is the current practice of lift-slab construction firms to hire only certified welders for critical welding tasks. However, OSHA solicits information on whether or not there is a need to define what constitutes a "certified welder." OSHA believes this may be necessary in order to assure that welders are indeed qualified to perform critical welds on the structural members. As an example, should the provision require connections to be welded by a person who possesses a valid certification granted by the State or local licensing board? Or, should certification by *any* authority be acceptable? How many organizations certify welders, particularly for structural welding operations? Are welders provided with certification cards that can be displayed to employers or others in authority?

15. The NBS in their report on the L'Ambiance Plaza investigation concludes that excessive deformations occurred in the lifting angle of the shearhead which was followed by one of the jack rods in the lifting assembly slipping off the lifting angle, initiating a chain reaction. (Ex. 34, p. v). Should OSHA require employers to institute measures (such as the use of locking nut caps, wedges or boards) to insure that the rods and nuts cannot slip out of position? Are such methods in use now? If so, please describe them.

16. To assist OSHA in gathering information related to the cost of the proposed lift-slab requirements, the following questions are asked:

a. How many companies are involved in lift-slab construction? What percentage of their revenues are derived from lift-slab construction?

b. What is the number of construction projects built annually using the lift-slab technology and what is the annual square footage of lift-slab projects?

c. What is the average value of these projects?

d. What is the current industry practice regarding keeping workers out from under slabs while lifting is occurring? If workers were not allowed in the building while slabs were being lifted, how would this affect the economics of using lift-slab? Would it be possible to schedule work such that productivity is not affected? Are there any additional economic factors that would make the lift-slab method more attractive compared to cast-in-place construction even though workers were not allowed in the building during the lifting operation?

e. How long (in hours, days, or weeks) does it take to lift a slab or groups of slabs from their casting location to their parked position? How long does it take to lift from the temporary position to the final or permanent position?

f. Once lifting starts, is there any reason that lifting would be stopped, with the load suspended on the jacks, prior to the slabs reaching their temporary or permanent positions?

g. Are permanent connections ever made as soon as floors are lifted into place, or does this always occur at a later stage in the construction process? If later, how much later?

## IV. Preliminary Regulatory Impact, Regulatory Flexibility and Environmental Impact Assessments

*Introduction*

The Occupational Safety and Health Administration (OSHA) has prepared this Preliminary Regulatory Impact Assessment (PRIA) in compliance with Executive Order 12291 and the Regulatory Flexibility Act of 1980 (Pub. L. 96–353, 94 Stat. 1164 [5 U.S.C. 60 *et seq.*]) OSHA has made a preliminary determination that the proposed revisions to the lift-slab provisions of the Concrete and Masonry Standard will not constitute a "major rule" as its net effect will be less than $100 million. In addition, it will not cause major increases in consumer prices or have a significant adverse effect on competition, employment, investment, productivity, innovation or on international trade. OSHA has also determined that the proposed revisions are technologically and economically feasible, and that the potential environmental impacts of the proposed requirements would not be significant.

*Industry Profile*

The lift-slab construction technique has been used in over 50 countries since its development in 1948 (Ex. 36–2, p. 169). The total worldwide volume constructed using this method is estimated to exceed half a billion square feet. Other than the L'Ambiance Plaza collapse in Bridgeport, Connecticut, on April 23, 1987, OSHA is aware of no other fatal accidents involving this construction technique.

Lift-slab methods can be more economical than cast-in-place methods, particularly for buildings where the framing is similar on all floors. Because the floor and roof slabs are all cast at ground level and jacked into position, the lift-slab technique eliminates the need for 90 percent of the formwork used in cast-in-place methods. Reducing the highly labor-intensive erection of formwork reduces costs and increases speed of construction (Ex. 36–14). As a result, the use of lift-slab can be a cost-effective alternative to cast-in-place methods, particularly in geographical areas having high labor costs.

Texstar Construction Corporation (Texstar) is the company involved in the greatest volume of lift-slab construction, having completed 800 buildings on 600 projects over the course of the 37 years that they have used this technology. These buildings have accounted for approximately 62 million square feet of lifted slab. Most recently, Texstar has been lifting about 2 million square feet of lift-slab per year on about 20 buildings in 10–15 projects. Of these projects, 40 percent are residential (apartments, condominiums, hotels, etc.), 50 percent are office buildings, 5 percent are parking structures and 5 percent are specialty buildings (Ex. 36–7).

Lift Plate International, a Florida construction company, has erected a number of 2- and 3-story buildings and is the only other company known to OSHA to do the actual lifting. Lift Plate International lifted about 600,000 square feet on about 10 buildings during the last year (Ex. 36–8). The two systems currently used by these respective companies vary primarily in the manner in which the columns are erected. This difference in turn determines the maximum height of the building. Lift-Plate International erects columns that are the full height of the building before lifting slabs; overall building height is limited to 10 stories. Texstar uses a series of three-story column extensions allowing for tall buildings (Ex. 36–17).

The lift-slab method of construction constitutes only a small fraction of all construction projects in the United States. Although published estimates of the amount have ranged from between 3 and 10 percent of all commercial projects (Exs. 36–3 and 4), these estimates appear too high. Based on data indicating the amount of floor space constructed by Texstar and Lift-Plate International, the lift-slab technique accounts for less than one percent of the 1,004 million square feet of commercial and industrial space constructed during 1987 (Ex. 36–11). (Although for certain building types and in certain regions the lift-slab method enjoys a cost advantage over other methods, industry representatives explain its relatively small market share primarily by lack of familiarity on the part of owners, designers and contractors).

This projection is consistent with the view of Clifford Freyermuth, the executive director of the Post Tensioning Institute who reports that the

lift-slab method of construction has declined in popularity over the years, accounting for no more than one percent of all construction (Exs. 36–10 and 12). He attributed this decline to the fact that, at one time, lift-slab held a cost advantage due to the relatively costly nature of formwork; but in the intervening years, innovative formwork systems such as flying forms or whole floor systems, have declined in cost and become more widely used.

*Costs of Compliance*

The proposed revisions to that portion of the concrete and masonry construction standard addressing lift-slab operations are for the most part taken directly from ANSI A10.9 (1983), and are essentially the same as the ANSI A10.9 (1970) provisions referenced in the original standard. The cost of these provisions was a part of the costs calculated for the ANSI referenced standards in the Concrete and Masonry RIA. The proposal prohibits all workers but those essential to the jacking operation from being in the building during "jacking operations." This is consistent with OSHA's interpretation of the recent ANSI clarification that "non-essential employees shall not work under or on top of the load that is not temporarily or permanently secured to columns" and with OSHA's current enforcement guideline for this provision of the standard.

This interpretation, however, is not universally accepted. Industry representatives and at least one federal judge (Ex. 36–18) have interpreted this provision to mean that non-essential workers had to be out from under only the immediate floor or floors being lifted. This distinction may make a difference in the economics of a project, particularly for buildings of five floors or more. Since lifting operations can occur over a period of several weeks, depending upon factors such as building size, weather, and other activities, excluding other craftsmen during this time could result in considerable delay to the construction schedule.

Officials of Texstar have estimated that imposition of this requirement alone would result in the loss of 75 percent of their business (95 percent of which is related to lift-slab activities) as it would no longer be cost-effective to use the lift-slab technique for buildings of more than four floors in height. It appears likely therefore that this provision would drastically reduce their volume of work and could conceivably force the company out of business. Texstar indicated that they have already cut their staff back from 24 to 7 employees as a result of a drop-off in business (Ex. 36–7). In addition, they have filed for bankruptcy under Chapter 11 as a result of the OSHA fines resulting from the L'Ambiance Plaza collapse and potential liability claims (Ex. 36–16).

Looked at from another perspective, lift-slab's cost advantage, although variable by region and size of building, averages about $2 per square foot (Ex. 36–7). If 75 percent of Texstar's current volume of business shifts to other construction methods in the future, this would translate into an increased annual cost of $3 million (2 million sq. ft. x .75 x $2) to building owners. Contrary to the potential problem faced by Texstar, Lift-Plate International has indicated that this requirement would have absolutely no impact on their business or their ability to compete for jobs. This firm primarily builds structures of 3 and 4 stories, where they lift for a week to a week-and-a-half and finish before the other trades enter.

A second requirement in the proposal addresses the loading of jacking equipment. It is clarified to ensure that the 2.5 safety factor applies to *all* jacking equipment, including columns, footings, and shearheads in addition to the actual jacks, lifting angles, lifting nuts, etc. Apparently this requirement had not been interpreted by everyone to include the columns, footings and shearheads. Both companies currently doing lifting have indicated that their components now meet the 2.5 safety factor (Exs. 36–7 and 8). Although columns were not always fabricated with a 2.5 safety factor, compliance will not be a substantial burden (Exs. 36–7, 8, and 9). The cost differential of moving from the previous safety factors to 2.5 varied from 2 percent to 10 percent, depending on the building. The relative cost impact of the 2.5 safety factor is actually greater for low rise than for high rise buildings where the columns constitute a larger part of the cost of the structure.

A third requirement in the proposal specifies that all welding on temporary and permanent connections be performed by a certified welder. Both companies report that the welds are so critical to the overall integrity of the structure that well-qualified welders are essential. Thus, both lifting companies have indicated that they currently use only "welders with papers"or "certified welders" and that this requirement would not affect them in any way (Exs. 36–7 and 8). This provision therefore has been determined to be current industry practice and no costs of compliance are anticipated.

The remaining provisions in the proposal are existing requirements in the current referenced ANSI A10.9 (1970) standard and there has been no indication from either industry or OSHA compliance staff that these requirements are other than current industry practice.

*Benefits*

The uncertainty surrounding the risks associated with the lift-slab method makes it difficult to estimate the benefits that would be attributable to changes in the standard. It can certainly be postulated that the deaths of many of the 28 workers killed in the L'Ambiance Plaza collapse would have been prevented if non-essential workers had been barred from the building during jacking operations. This incident, however, is the only known fatal lift-slab-related accident to occur over the 39 years the method has been in use. Thus, the determination of the likelihood of future incidents and the number of potential fatalities that would be avoided as a result of this standard is problematical.

Some of the hazards that workers are exposed to while performing lift-slab operations are the same as those found in conventional cast-in-place techniques. Texstar has indicated that lift-slab is a safe method as reflected by their lost workday injury rate of 8.2 days lost per 10,000 days worked and their workers' compensation experience modifier of 0.8 for the period from 1976 to 1987. This does not include the injuries and fatalities of the L'Ambiance Plaza collapse at Bridgeport. (Ex. 36–2). This translates into an annual rate of 20.5 lost workdays per 100 full-time workers as compared to a rate of 122.5 lost workdays per 100 full-time workers for all of the construction industry during this same time period and 124.3 for SIC 1770—Concrete Work (Ex. 36–5). Moreover, Lift-Plate International has indicated that they have had no recordable injuries related to lift-slab activities (Ex. 36–8).

These company records, however, do not represent the total risk picture for lift-slab operations because they do not account for injuries or deaths to employees of other firms. For example, Texstar is but one subcontractor on a jobsite and other subcontractors' employees may also be exposed to risk. Of the 28 workers killed in the Bridgeport collapse, there were 7 carpenters, 7 ironworkers, 7 laborers, 3 plumbers, 1 electrician, 1 operating engineer, 1 bricklayer and 1 supervisor (Ex. 36–19). Texstar had only 17 workers on site and of these, 8 were killed and 2 were injured (Ex. 36–20). This catastrophe accounts for 24% of the fatalities (28/117) that resulted from the

5 major concrete building collapses during the last 15 years. (See the Final Regulatory Impact Assessment of the Standard on Concrete and Masonry Construction, p. IV–5, Ex. 13A of Docket S–301A).

Nevertheless, industry commenters vigorously contend that restricting the availability of lift-slab methods would serve to increase the level of work-related risk by forcing workers who now work on lift-slab jobs at ground level to be exposed to the more severe hazards associated with erecting formwork systems at heights (Exs. 36–7, 8, 9, and 15). For example, in January 1988, two workers were killed and two were seriously injured when the topping lift pulled free of the boom on a mobile crane carrying for work lumber to the second level of a building under construction (Ex. 36–13). The lift-slab method had reportedly been considered for this project but was rejected due to safety concerns following the Bridgeport failure.

In an ongoing analysis of structural failures, John Loss at the University of Maryland's Architectural and Engineering Performance Information Center has looked at many structural failures covering the period 1965 to the present and has found none that involved the lift-slab method of construction (Ex. 36–6). He states that "all construction is unsafe" and that "during construction, the buildings are in their most critically unstable mode."

In sum, the available data indicate that where lift-slab operations can comply with the standard while remaining cost effective, the proposed provisions will enhance worker safety by significantly reducing worker exposure to potentially catastrophic incidents. Where the standard causes life-slab methods to be discontinued in favor of other construction methods, such as cast-in-place methods, the effect on worker risk levels remains uncertain, and may either decrease or increase. Clearly, OSHA's mission is to protect workers by reducing the risk. OSHA requests additional public comment on this issue.

*Other Economic Effects*

Environmental Impacts

The proposed revisions to the lift-slab requirements have been reviewed in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4231 *et seq.*), the Regulations of the Council on Environmental Quality (CEQ) (40 CFR Part 1500), and DOL's NEPA Procedures (29 CFR Part 11). As a result of this review, the Assistant Secretary for OSHA has determined that the proposed revision would have no significant environmental impact.

Although safety standards rarely influence air, water, or soil quality, plant or animal life, or the use of land or other aspects of the environment, it is appropriate to examine whether the proposed lift-slab requirements will alter the environment external to the workplace. Examination of the proposed revisions show that they consist primarily of clarifications in work practices and procedures and therefore will have no significant environmental effects.

Regulatory Flexibility Certification

Although the firms that will be most affected by this revised regulation are best described as small businesses, only two firms will be impacted. Therefore, OSHA has determined that this regulation, if promulgated, will not have a significant economic impact on a substantial number of small entities.

**References to Section IV—Preliminary Regulatory Impact, Regulatory Flexibility and Environmental Impact Assessments—Exhibit 36**


1. Frank A. Randall, Jr., "New Developments in Lift-Slab Construction" *Concrete Construction*, Feb. 1986, p. 117.
2. Construction Advisory Committee Meeting, 3/30/88 transcript p. 144 testimony of Mr. Russillo, Vice President of Texstar.
3. "All Construction is Unsafe," Billings Gazette, 4/2/87.
4. Occupational Safety and Health Reporter, the Bureau of National Affairs, 8/5/87, pp. 407–408.
5. U.S. Department of Labor, Bureau of Labor Statistics, *Occupational Injuries and Illnesses by Industry, 1986*, unpublished data.
6. "Collecting Data on Building Disasters", *newspaper article.*
7. Personal communication, Chris Geckler, Executive Vice President and Michael Russillo, Engineer, Texstar Construction Corporation, with Marilyn Schuster, OSHA, Washington, DC, May 5 and 10, 1988.
8. Personal communication, Peter Vanderklaauw, President, Lift Plate International, with Marilyn Schuster, OSHA, Washington, DC, May 9, 1988.
9. Personal communication, William Rogers, President, Rogers International Corporation, with Marilyn Schuster, OSHA, Washington, DC, May 6, 1988.
10. Personal communication, Clifford Freyermuth, Executive Director, Post Tensioning Institute, with Barbara Bielaski, OSHA, Washington, DC, May 9, 1988.
11. U.S. Congress, Joint Economic Committee, *Economic Indicators*, Government Printing Office, Washington, DC, April 1988.
12. "Lift-Slab Method No More Risky Than Other Techniques," Bridgeport Telegraph, April 24, 1987.
13. "Topping Lift Blamed in Mishap," *Engineering News Record*, January 28, 1988.
14. U.S. Department of Commerce, National Bureau of Standards, *Investigation of L'Ambiance Plaza Building Collapse in Bridgeport, Connecticut*, NBSIR 87–3640, Gaithersburg, MD, September 1987.
15. Written correspondence from Marshall Long, President, International Lift-Slab Corporation to Ralph Geckler, President, Texstar Construction Corporation, December 10, 1987.
16. "Lift-Slab Builder Bankrupt", *Engineering News Record*, April 7, 1988, p. 17.
17. "Recent Construction Disaster Raises Questions About Practices," *Multi-Housing News*, N.Y., NY, July 1987, pp. 37 and 38.
18. William Brock vs. S & S Realty Trust, U.S. District Court, District of Massachusetts, CA 87–2175–WD, September 2, 1987.
19. "Reagan Safety Policy Draws Council's Fire", *AFL–CIO News*, May 9, 1987.
20. OSHA press release package for 10/22/87 News Conference.


**V. OMB Approval Under the Paperwork Reduction Act**

There are no collections of information proposed in this section. Therefore, approval by OMB under the Paperwork Reduction Act is not necessary.

**VI. Public Participation**

Interested persons are invited to submit written data, views, and arguments with respect to this proposal and all issues involved therein. The comments must be postmarked on or before November 14, 1988, and submitted in quadruplicate to the Docket Officer, Docket No. S–301B, U.S. Department of Labor, 200 Constitution Avenue NW., Room N–3670, Washington, DC 20210. Written submissions must clearly identify the provisions of the proposal which are addressed and the position taken with respect to each issue.

The data, views, and arguments that are submitted will be available for public inspection and copying at the above address. All timely written submissions received will be made a part of the record of this proceeding.

Additionally, under section 6(b)(3) of the OSHA Act (29 U.S.C. 657), section 107 of the Construction Safety Act (41 U.S.C. 333) and 29 CFR 1911.11, interested persons may file objections to the proposal and request an informal public hearing. The objections and hearing request should be submitted in quadruplicate to the Docket Officer at the address above and must comply with the following conditions:

1. The objections must include the name and address of the objector;

2. The objections must be postmarked on or before November 14, 1988 and submitted to the Docket Office at the aforementioned address;

3. The objections must specify with particularity the provision(s) of the proposed rule to which objection is taken, and must state the grounds therefor;

5. The objections must be accompanied by a detailed summary of the evidence proposed to be adduced at the requested hearing.

If objection and request for a hearing are timely filed, a hearing will be scheduled pursuant to section 6(b)(3) of the Occupational Safety and Health Act of 1970.

OSHA recognizes that there may be interested persons who, through their knowledge of safety or their experience in the operations involved, would wish to endorse or support certain provisions in the standard. OSHA welcomes such supportive comments, including any pertinent accident data or cost information which may be available, in order that the record of this rulemaking will present a balanced picture of the public response on the issues involved.

### VII. State Plan Requirements

The 25 States and territories with their own OSHA-approved occupational safety and health plans must revise their existing standards within six months of the publication date of the final standard or show OSHA why there is no need for action, e.g., because an existing State standard covering this area is already "at least as effective" as the revised Federal standard. These States and territories are: Alaska, Arizona, California, Connecticut, (State and local government workers only), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, New York, (State and local government workers only), North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington and Wyoming.

### VIII. Federalism

The proposed standard has been reviewed in accordance with Executive Order 12612 (52 FR 41685; October 30, 1987) regarding Federalism. This Order requires that agencies, to the extent possible, refrain from limiting State policy options, consult with States prior to taking any actions that would restrict State policy options, and take such actions only when there is clear constitutional authority and the presence of a problem of national scope. The Order provides for preemption of State law only if there is a clear Congressional intent for the agency to do so. Any such preemption is to be limited to the extent possible.

Section 18 of the Occupational Safety and Health Act (OSH Act), expresses Congress' clear intent to preempt State laws relating to issues with respect to which Federal OSHA has promulgated occupational safety or health standards. Under the OSH Act a State can avoid preemption only if it submits, and obtains Federal approval of, a plan for the development of such standards and their enforcement. Occupational safety and health standards developed by such Plan-States must, among other things, be at least as effective in providing safe and healthful employment and places of employment as the Federal standards.

The Federally proposed lift-slab standard is drafted so that construction workers in every State would be protected by general, performance-oriented standards. To the extent that there are State or regional peculiarities that could alter construction methods, States with occupational safety and health plans approved under section 18 of the OSH Act would be able to develop their own State standards to deal with any special problems. Moreover, the performance nature of this proposed standard, of and by itself, allows for flexibility by States and contractors to provide as much safety as possible using varying methods consonant with conditions in each State.

In short, there is a clear national problem related to occupational safety and health of construction workers. While the individual States, if all acted, might be able collectively to deal with the safety problems involved, most have not elected to do so in the seventeen years since the enactment of the OSH Act. Those States which have elected to participate under section 18 of the OSH Act would not be preempted by this proposed regulation and would be able to deal with special, local conditions within the framework provided by this performance-oriented standard while ensuring that their standards are at least as effective as the Federal standard. State comments are invited on this proposal and will be fully considered prior to promulgation of a final rule.

### List of Subjects in 29 CFR Part 1926

Construction safety, Concrete construction, Lift-slab construction, Occupational safety and health, Precast concrete.

### IX. Authority

This document was prepared under the direction of John A. Pendergrass, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210.

Accordingly, pursuant to sections 4, 6, and 8 of the Occupational Safety and Health Act of 1970 (84 Stat. 1593, 29 U.S.C. 653, 655, and 657); section 107 of the Contract Work Hours and Safety Standards Act (83 Stat. 96, 40 U.S.C. 333); Secretary of Labor's Order No. 9–83 (48 FR 35736); and 29 CFR Part 1911, it is proposed to amend Part 1926 of Title 29 of the Code of Federal Regulations as set forth below.

Signed at Washington, DC, this 9th day of September, 1988.

**John A. Pendergrass,**

*Assistant Secretary of Labor.*

## PART 1926—[AMENDED]

1. The authority citation for Part 1926 would continue to read as follows:

**Authority:** Sec. 107, Contract Work Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333); Secs. 4, 6, and 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, and 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), or 9–83 (48 FR 35736), as applicable; and 29 CFR Part 1911.

### § 1926.305 [Amended]

2. By proposing to amend § 1926.305 to remove and reserve paragraph (b).

3. By proposing to amend paragraph (b) of § 1926.700 to add definitions (b) (9) and (10) for two terms as follows.

### Subpart Q—Concrete and Masonry Construction

### § 1926.700 Scope, application and definitions applicable to this Subpart.

(a) * * *

(b) *Definitions applicable to this subpart.*

* * * * * *

(9) "Jacking operation" means the task of lifting vertically, a slab (or group of slabs) from one location to another (e.g., from the casting location to a temporary (parked) location, or from a temporary location to another temporary location, or to its final location in the structure), during the construction of a structure where the lift-slab process is being used.

(10) "Qualified designer" means a person who, by possession of a degree, certificate, or professional standing, has demonstrated ability in design in the subject under regulation.

* * * * * *

4. By proposing to revise § 1926.705 to read as follows:

### § 1926.705 Lift-slab operations.

(a) Lift-slab operations shall be designed and planned by a qualified designer—qualified in lift-slab operations. Such plans and designs shall be implemented by the employer and

shall include detailed instructions and sketches indicating the prescribed method of erection.

(b) Jacks shall be marked to indicate the rated capacity established by the manufacturer.

(c) Jacks shall not be loaded beyond the rated capacity established by the manufacturer.

(d) Jacking equipment shall not be overloaded and the threaded rods and other members (such as, but not limited to the following: jacks and other lifting units, lifting angles, lifting nuts, hook-up collars, T-caps, shearheads, columns, and footings) that transmit loads to the jacks shall be capable of supporting at least two and one-half times the load to be applied.

(e) Jacks shall be designed and installed so that they will neither lift nor continue to lift when they are loaded in excess of their rated capacity.

(f) Jacks shall have a safety device installed which will cause the jacks to support the load in any position in the event any jack malfunctions or loses its lifting ability.

(g) Jacking operations shall be synchronized in such a manner to ensure even and uniform lifting of the slab. During lifting, all points of the slab support shall be kept within ½ inch of that needed to maintain the slab in a level position.

(h) If leveling is automatically controlled, a device shall be installed that will stop the operation when the ½ inch tolerance set forth in paragraph (g) is exceeded or where there is a malfunction in the jacking system.

(i) If leveling is maintained by manual controls, such controls shall be located in a central location and attended by a competent person while lifting is in progress.

(j) The maximum number of manually controlled jacks on one slab shall be limited to a number that will permit the operator to maintain the slab level within specified tolerances.

(k) No employees (except those essential to the jacking operation) shall be permitted in the building while any jacking operation is taking place. For the purpose of this provision, a jacking operation begins when a slab or group of slabs is lifted and ends when such slabs are secured (with either temporary connections or permanent connections).

(l) When making temporary connections to support slabs, wedges shall be secured by tack welding or an equivalent method of securing before the load is released from the lifting unit.

(m) All welding on temporary and permanent connections shall be performed by a certified welder, familiar with the welding requirements specified in the lift-slab plan and specifications.

(n) Load transfer from jacks to building columns shall not be executed until the welds on the column shear plates are cooled to air temperature.

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